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NOVEMBER, 1947

School Shop

FOR INDUSTRIAL ARTS & VOCATIONAL EDUCATION TEACHERS

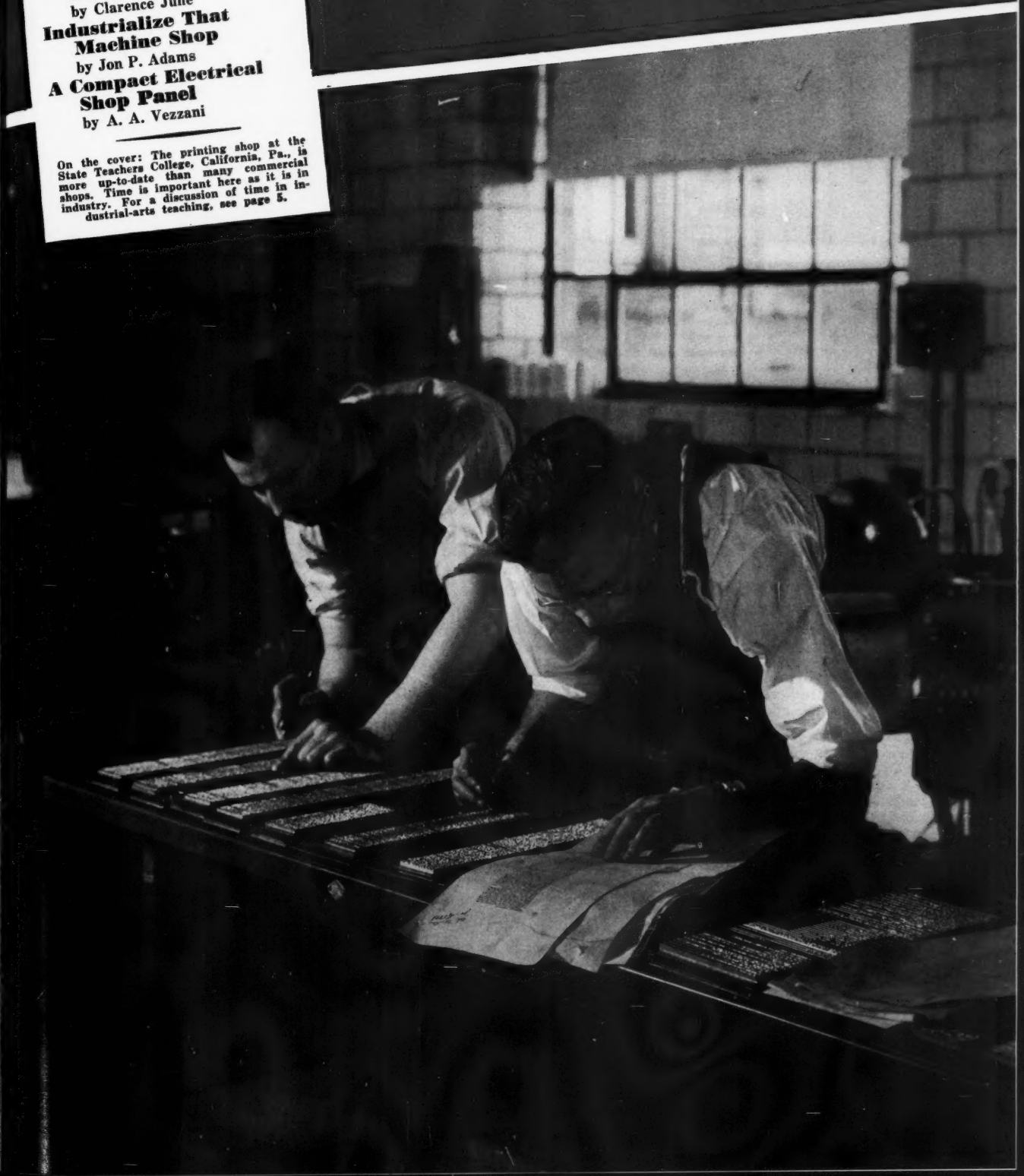
The Time Element in Industrial Arts
by F. C. Finsterbach

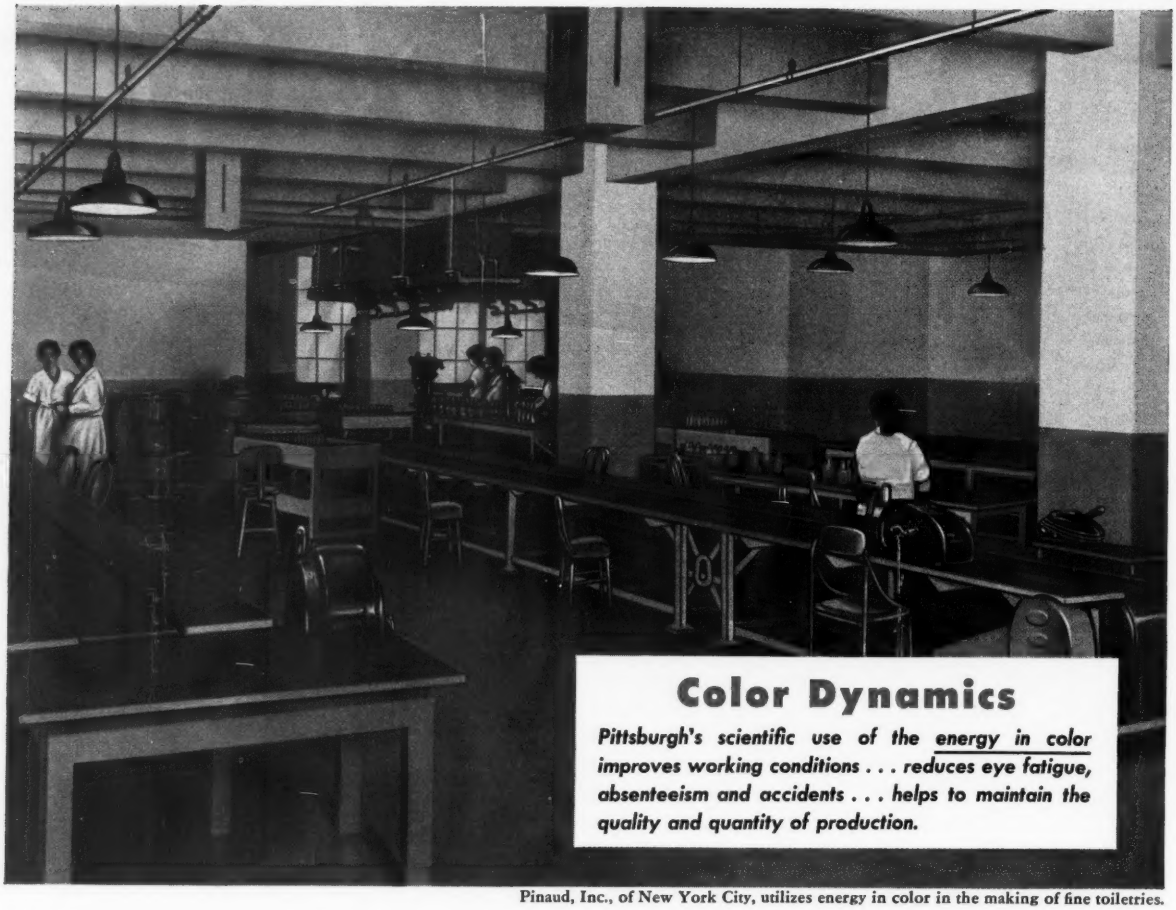
Shop-Made Beam Compass
by Clarence June

Industrialize That Machine Shop
by Jon P. Adams

A Compact Electrical Shop Panel
by A. A. Vezzani

On the cover: The printing shop at the State Teachers College, California, Pa., is more up-to-date than many commercial shops. Time is important here as it is in industry. For a discussion of time in industrial-arts teaching, see page 5.

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In the Offing . . .

Veterans' education at the vocational level will be discussed in next month's issue which will also contain a number of projects which have actually been used in teaching situations. The usual wide variety of features such as School Shop Talk, Kinks, and From Washington will bring you the latest developments in the field.

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School Shop

FOR INDUSTRIAL EDUCATION TEACHERS

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School Shop TALK

COMMENTS ON ISSUES FACING INDUSTRIAL EDUCATION

A Far Cry—Or Is It?

One thing stands out indelibly in my mind after spending a few weeks in Europe this summer. It is the terrible destruction of war, both physical and spiritual. Two years have passed since an uneasy peace has come to most of Europe, yet the sores of World War II have not even begun to heal. Thousands on thousands of schools in war-devastated Europe are still a mass of rubble and debris. Thousands on thousands of teachers have no proper equipment or materials with which to instruct their charges. Many a teaching position is vacant because no qualified teacher can be found.

In Paris I stopped at the headquarters of the United Nations Educational, Scientific, and Cultural Organization. It was heartening to find here an international organization actively engaged in doing something about the problems of the war-devastated countries in the field of education. Holding a top priority on the list of activities of Unesco is "the reconstruction of educational, scientific, and cultural activities in countries, members of Unesco, which have been devastated by the war." I need not remind the readers of SCHOOL SHOP that the United States is a member of Unesco and that as teachers we have a special interest in its activities. Yet, the problems of other parts of the world seem far away and insignificant compared to our own everyday difficulties.

But are they?

The speed and ease of modern air travel are commonplace knowledge. That Europe is mighty close to us was brought home to me when I had breakfast one day in Paris and lunch the next day in Washington. In terms of the effects of the Marshall plan on our internal economy, Europe is as close as the corner grocery store.

We are citizens of the United States, but we are also citizens of the world. As teachers, our natural interest is in education—whether in Westchester County or in Cook County; in Alsace or in London.

This is where Unesco fits into the picture. For the first time, we as teachers have an organization expressly designed on a world scale for the betterment of education and consequently for the betterment of the world community. The beginnings have only begun to be made, of course, as Unesco is only a year old this month. While you are reading this, educators from all the member nations will be discussing problems of education at the second general conference which is convening this month in Mexico City. An important item on the agenda is educational reconstruction.

Tragically enough, schools for industrial education were among the hardest hit in the war-devastated areas. The machinery and equipment in such schools was destroyed or looted in large quantities. Often the buildings themselves were severely damaged or utterly destroyed. (An interesting sidelight is the fact that the German surrender on the western front was signed in the vocational school at Reims.)

Unesco so far seems to have paid little attention to industrial education as such. Yet this is not entirely true. Unesco is just as interested in the reconstruction of vocational schools as of any other type.

As teachers of shop subjects in the United States, we have a certain fellow feeling for similar teachers in Europe. The reconstruction problem in Europe affects schools with industrial-education programs especially poignantly. Trained manpower to help in putting Europe back on its economic feet is a desperate need. The United States government will have to help until Europe can help itself more effectively. If industrial-education programs rolled once again at full speed, it would be a real boost.

We can all help. Unesco is working hand in glove with the Committee for International Educational Reconstruction which has been formed in this country. This committee has offices at 744 Jackson Place, NW, Washington, D. C. It has worked out procedures for helping schools in war-devastated areas through organizations with the facilities for actually administering aid. You can help as a shop teacher or administrator by writing to this committee and asking for material on how your school might help a war-victim school in Europe.

Your Editor

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This is the first of several ads addressed to the student-readers of Scholastic Magazines. Be prepared to support the enthusiasm it arouses in your school. Get complete information on the Woodworking Divisions of the Scholastic Industrial Arts Competition, by writing today to Scholastic Magazines, 220 East 42nd Street, New York 17, New York.
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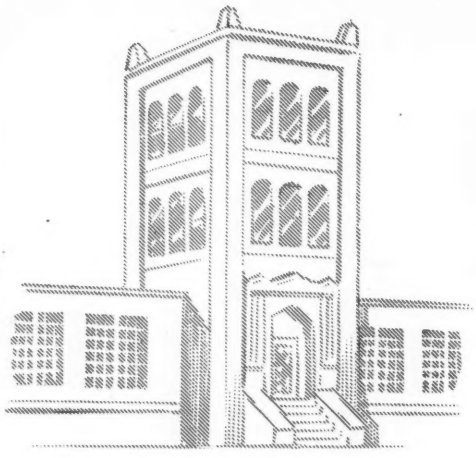

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The Time Element in Industrial Arts

BY *F. C. Finsterbach*

Time is of the essence throughout industry. Yet, in industrial arts, little attention has been paid to it. Here is a procedure for remedying the situation. F. C. Finsterbach is a member of the faculty of the Industrial-Arts Department, State Teachers College, Buffalo, New York.

THE element of time is of major importance in industry. In many plants, men are employed for no other reason than to make time-and-motion studies in order to determine the most efficient method of performing certain operations and to set rates for piecework, bonus systems, and production-promotion or incentive plans. Deadlines, penalties, and bonuses are written into many construction contracts to insure completion of work within a reasonable time. Some of the controversy which arises between management and labor often springs from differences of opinion in regard to the timing of work.

In our studies of industry throughout the entire industrial-arts curriculum area, very little attention is paid to the element of time as it affects the production of the student. Much of our project work remains highly individualized on a custom basis. Modern production methods and devices are seldom utilized, and often unheard of, in our industrial-arts classes. While too much emphasis on production might overlap with the work in vocational education, certainly some elements should be presented which will convey a true picture of modern industry.

The development of the general shop, especially the comprehensive type wherein several unrelated activities are carried on more or less simultaneously, has caused many changes in method, procedure, and technics. A number of these changes are concerned with the element of time. The timing of units of work, the shifting of groups from unit to unit, the amount of time an individual should spend on a given activity are a few examples. Correct timing is the essential consideration which enters into almost every instructional problem.

To enable the student to become acquainted with the problem of time and become imbued with a greater appreciation of its effect on production, we devised a "wage-incentive plan" which is applied to the student's project work. Essentially it is this:

1. Each project is given a *time standard* or *contract* for its accomplishment.
2. The student works with this time standard as a goal.
3. He is given a bonus if he beats the time standard.
4. He is moderately penalized if he falls below the time standard.
5. The *quality* of his work is evaluated separately.

The basic time standards were first established from a composite of time records of former students. These were checked by work performed by student-teachers. Where no records were available, an estimated time was tentatively set. These standards are constantly revised and their accuracy improved as more and more projects are completed.

To inaugurate this plan, several devices became necessary.

First, a file card was used for each project. On this card is placed the name of the project, the time standard at present, and a record of the actual time used by other students. This becomes a sort of permanent record. Supplementing this record is an automatic list finder, such as is used for telephone numbers. This is for quick reference and carries the project name and the standard time.

Second, a place was provided on the regular planning sheet (bill of materials, etc.) for the following entries:

Date started_____.
Date finished_____.
Contract time, ____ hours.
Actual time, ____ hours.
Credits claimed, ____ points.
Credits allowed, ____ points.

Third, a cumulative point system was adopted for the recording of achievement and the marking of report cards.

The student proceeds as follows: When he elects to make a certain project, he looks up the *contract time* on the list finder and makes the proper entries on his plan sheet. His time then begins and the elapsed time from start to finish is interpreted in *points* with due allowance for credit or debit as the individual case may be.

For example, the *contract time* established for a pair of bookends, cast in metal, copper plated, chemically colored, and lacquered is set at *six hours*. This time includes all the project operations, i.e., the plan sheet filled out, related topics studied and reported, prices looked up and total cost calculated, and the actual molding, casting, trimming, and finishing of the bookends.

Student-teacher Sherrill Webb looking up the contract time allowed for a project on the automatic list finder.

ANVIL — Division: Foundry

Contract time, 4 hours painted; 5 hours plated.

Record of time:

Painted	Plated
4	4
3	5
5	6.25
7	5
3	5
3	5
4	6
4	5

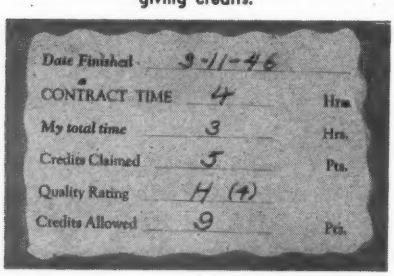
File card for a project showing the contract time and a history of the time record of various students making it.

If the student completes this in six hours, he can claim six points (one for each hour). If he completes it in five hours, he can claim the *difference* between the *contract time* and his *actual time* as a *bonus* to be *added*. In this case, the student earned one plus six, or a total claim of seven points. If, on the other hand, he had taken seven hours to do the work that he was supposed to do in six hours, the *difference* would be *subtracted* from the contract time and he would have received only five points of credit for the project, based on time alone.

The quality of his work is evaluated separately for obvious reasons. The two elements, *time* and *quality*, combine to give a final evaluation of his work. The total points thus earned by the student in a given interval are interpreted in letter grades or percentiles for the report card and official records.

Consideration must be given to human elements in the operation of this plan, of course. It cannot be run as an inflexible system. Individual differences, rate of learning, previous experience, aptitude, all must be taken into consideration when setting a standard for a particular project for a particular boy. Incidentally, these same elements enter into all grading systems so it is possible that the disadvantages of the contract-point system are no greater than those of other methods.

How notations are made on planning sheet for giving credits.



Among the advantages, however, that of increased interest stands first. The student is challenged by the contract time and naturally tries to beat it. He becomes conscious, perhaps for the first time in his life, of the value placed on time. This helps to promote efficient use of his time and prevents dawdling and similar work dodges. By actual participation, the student also learns something about the working of incentive plans and the interrelationship of time and quality in production. In the school shop, the plan calls for some research, time study, production promotion, and similar industrial procedures. For the instructor, it provides a more nearly equitable basis for evaluation of work in the generalized shop where one student might make four small projects while another works on one larger item. The difference in the contract time allowed provides a basis for the fair treatment of each individual. Naturally, the more involved the project, the greater are the amounts of time and points allowed for completion.

In practice, the plan works out well. Most students, stimulated by the possible bonus, cover more ground. Judging the quality separately and evaluating it in points offsets any tendency to race and sacrifice quality to speed. Any spurious bonus gained by speed alone can be more than wiped out by a low-quality rating.

The credit points and contracts permit many auxiliary uses. Arbitrary points may be given for home or special assignments. Full credit may be awarded the day the work is due, with one point less for each day the assignment may be late. The quality of each assignment may here again be evaluated separately.

A continuous graph of the accumulated credit points is an interesting device and serves as a form of progress chart.

The plan is not a difficult one to set in operation, once the contracts are established. The experienced instructor can often gage the average time that it ought to take for completion of a given project. If not, a breakdown of the operations and a separate time study of these will establish a fair standard. The students enjoy being timed with a stopwatch while performing a single operation.

One final word of caution seems necessary in the use of a time plan. Avoid making the contracts too close, revise contracts downward only when a large number of cases make change desirable, and give the student the break on close decisions. It is also advisable to deal in hour units by crediting any fraction of half or over as an hour.

AVA Convention to Be Held in Los Angeles Next Month

Highlights of the American Vocational Association Convention in Los Angeles, December 15 to 18, include an outstanding series of general sessions with top-flight speakers, section meetings of special interest, a banquet to be held at the Earle Carroll Theater Restaurant with the floor show providing the entertainment, and a series of visits to educational institutions in the Los Angeles area, as well as to places of scenic and historic interest.

The convention opens on Monday evening, December 15, with a general session program to be presented by the National Council of Local Administrators of Vocational Education and Practical Arts. The convention closes on Thursday afternoon, December 18, at 5 P.M.

Several affiliated organizations will hold sessions on Saturday and Sunday, December 13 and 14, preceding the opening of the convention the following day.

The general session on Tuesday evening will be addressed by one of the leading AVA past-presidents, by one of America's outstanding superintendents of schools, and by a brilliant woman speaker from a lay organization interested in education.

Several special programs based on current needs and developments in vocational education will be presented by the section groups of the AVA.

A special program on vocational education and its relation to international economic recovery has been arranged for the many international visitors who are planning to attend the convention.

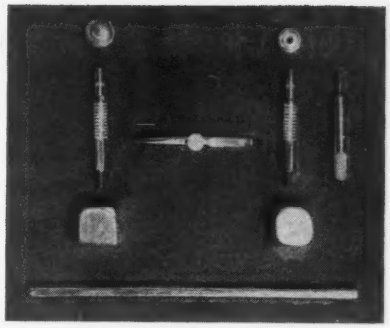
Applications for hotel reservations may be obtained from the AVA, 1010 Vermont Ave., Washington 5, D.C.

Special arrangements are being made for a group to travel together to the convention. Stops are planned at Denver, Salt Lake City, and San Francisco to visit schools and points of interest. Further details may be secured from the AVA office in Washington.

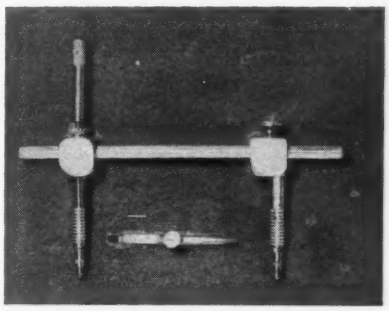
Shop-Made Beam Compass Will Interest Students

BY *Clarence June*

This project offers the opportunity of tying in the work of the drafting department with the machine shop and also gives the student a valuable piece of equipment for his drawing set. Clarence June teaches at the J. M. Wright Technical School, Stamford, Conn.



Parts of the beam compass. The ruling pen in the center is taken from a standard drafting set.



The beam compass assembled and ready for use.

MOST drafting students are eager to make a beam compass to have in their own kit of drawing instruments. The machine operations for this project are fairly simple and consist of lathe work, drilling, tapping, threading, shaping or milling, and simple broaching. The project makes an excellent opportunity for tying in the work of the drafting department with the machine shop.

The materials used to make the parts should be of some nonferrous alloy such as brass, nickel, silver, monel, or aluminum. The compass described in this article was made of brass and was chromium plated.

The chucks used to hold the center and drawing lead were obtained from lead holders for artists which were obtained at a local store. The rest of the parts were fabricated in the shop. In adapting the purchased lead-holder chuck for the compass, the wooden part of the pencil was removed and the end of part 3 in the drawing was turned for a press fit in the chuck. Two of part 3 are required.

Complete information on fabricating the parts may be found by referring to the drawing. In addition the following information will be of help.

All tapped holes and threaded lengths are a No. 5-40 N.C. thread except the thread "A" in the center of the bottom of part 2 which should be the same size as the threading on the ruling pen which can be substituted for the pencil when doing ink work. The ruling pen from any standard drafting set can be used.

The tapped hole in the bottom of part 1 into which part 3 screws should be tight and assembled with a wrench. This should not be the case with part 3 where it screws into part 2, of course, as this is where the ruling pen would be substituted when needed.

The hexagonal holes in parts 1 and 2 are made by first drilling with a ¼" drill and then broaching with a broach made from a piece of ¼" hexagon wrench stock. The five undercuts, spaced equally on part 5, are 1/32" wide by .010" deep.

Part 4 serves as a lock nut and keeps part 5 from loosening when the compass is being used. Part 7 should be made in varying lengths. The suggestions for the lengths are given on the drawing.

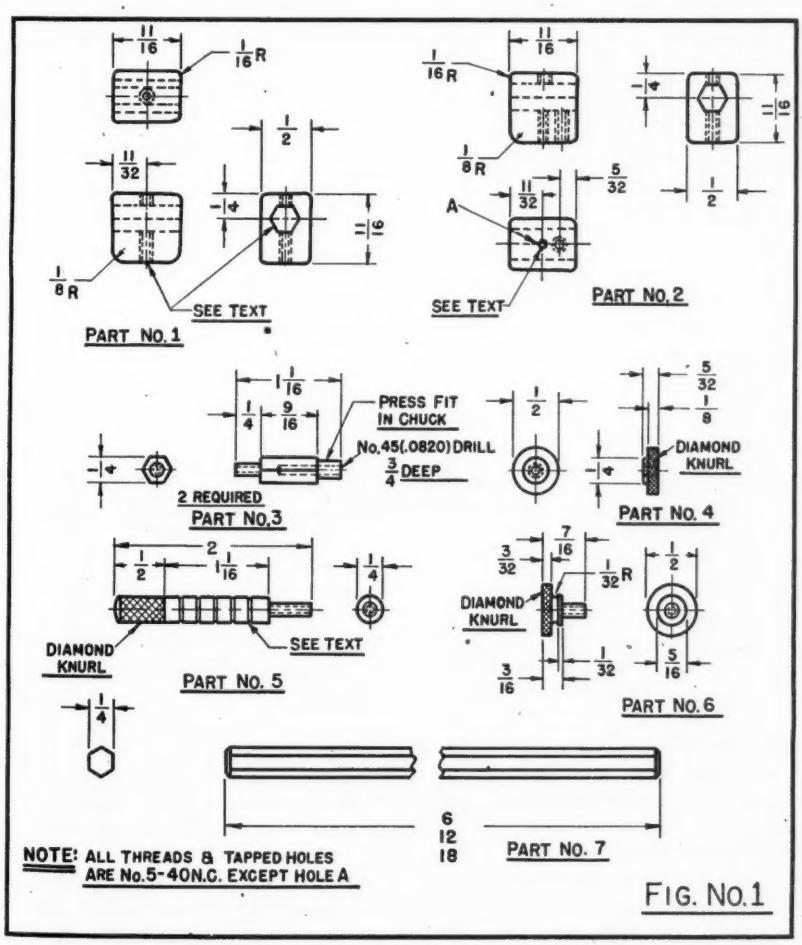
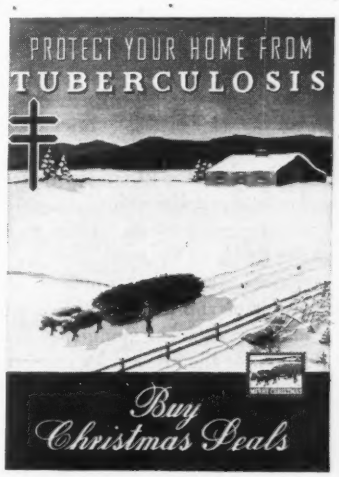
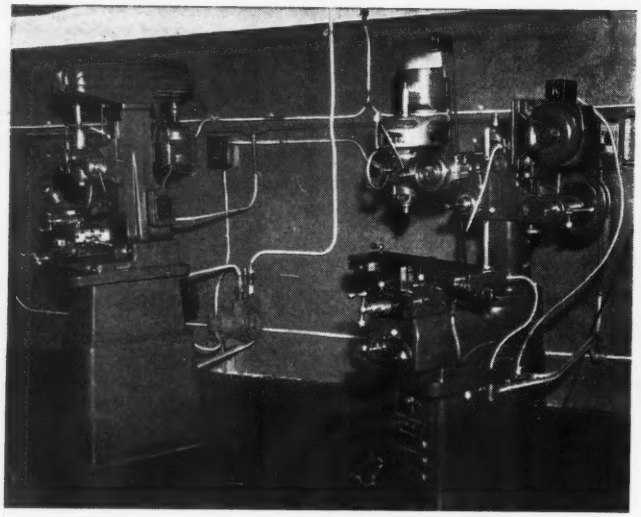
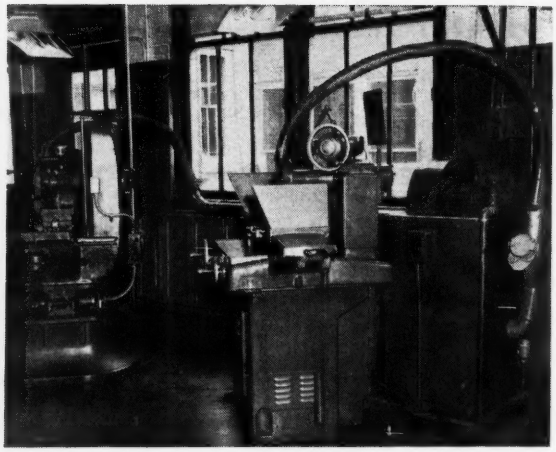


FIG. NO. 1







Left—Coolant pump system installation. Right—Exhaust system for grinder dust. These installations are at Proviso Township High School, Maywood, Illinois.

Industrialize That Machine Shop

BY *Jon P. Adams*

School machine shops should keep abreast of industrial practices in providing adequate exhaust systems, proper coolants, and cutting oils, states the author, who illustrates how the installations were made in a school shop. Jon P. Adams is Assistant Supervisor of Trade and Industrial Education, State Board for Vocational Education, Springfield, Illinois.

MORE than in any other field of industrial education, the secondary-school machine shop has made advancements in the acquisition of additional equipment. In many instances, this equipment is of late design and has served to keep many school shops abreast of the advancements in machine tools found in industry.

The mere installation and use of additional equipment, however, does not necessarily mean that the machine is being used effectively. The proper use of coolants, cutting oils, and dust exhaust systems are but a few of the factors which contribute to equipment being used to best advantage. Many school shops do all of their machine operations dry, which is not in keeping with modern shop practice. The use of cutting oils or compounds in the machine shop may be summed up as follows:

1. To lubricate the chip, which in turn lessens generation of heat;
2. To carry off heat generated by the cutting action of the tool;
3. To increase the life of the tool;
4. To flush out the chips;
5. As the result of the above, to improve the finish on the work.

Machines should be provided with some means of applying suitable cutting compounds in sufficient quantities to accomplish all of the above. A mere drip may furnish the lubricating action desired; but if the cut is heavy, enough volume must be supplied to furnish the necessary heat-dissipating and chip-flushing action.

Most of the machines received from governmental agencies were used in war production, and are usually equipped with coolant pumps. Many of the machines which the school had and some received from the government do not have pumps; therefore, the school should provide some means of supplying coolant, or cutting oil.

There are several methods which may be used. For lack of any other means, it may be supplied with a small paint brush. A more satisfactory method is by means of a gravity drip tank, holding about one quart and equipped with hose, nozzle, and suitable valve. Both of the above methods fulfill the requirements of furnishing a lubricant but do not furnish volume enough to dissipate the heat generated and to flush away the chips.

By far the most satisfactory method is to deliver the oil to the cutter by means of a pump. Individual coolant pumps may now be secured for as low as $45 for a complete unit. These are complete units with tank and hose connections and may be installed on a machine in a very short time. The pump purchased at this price will furnish about 60 gallons of cutting oil per hour, or about 240 gallons of soluble oil with the outlet about 4′ above the pump. This would be adequate capacity for most installations on individual machines.

If the shop has a number of machines lacking pumps, the oil distribution system may be manifolded as illustrated in the photograph. This picture shows two of the four machines supplied with oil from the same source. In this case, the base of the machine in the left of the illustration was changed to a tank by welding on a bottom. The oil from each machine returns to this tank through a manifold made of ¾″ tubing, which is brazed at all the joints. The cutting oil is supplied to the tool by gravity from a tank of about 15-gallon capacity, located just above the valve in the illustration. This is piped through ½″ seamless tubing to all of the machines. Each machine has its own valve and discharge tube, as is clearly indicated on the right-hand machine in the illustration.

The coolant is pumped from the sump in the base of the machine to the gravity supply tank by means of a centrifugal pump with a 1″ pipe outlet. The pump is started by means of a float-actuated switch in the sump. When the float reaches a predetermined level, the pump starts and returns the oil to the upper tank, and when it reaches the lower level it will automatically stop. The pump may be piped directly to each machine, thus eliminating the upper tank, but in this case, it will have to run constantly.

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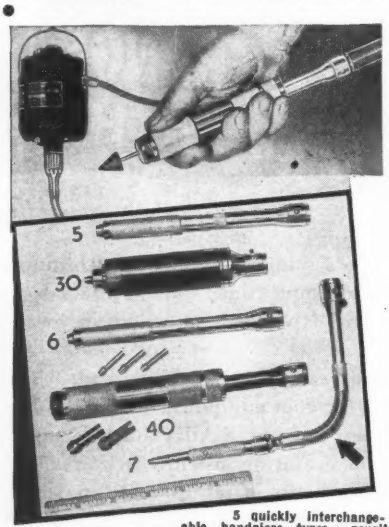

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With the gravity-tank arrangement, the pump runs only a few minutes to return all of the oil. Thin-wall conduit was used for tubing and all joints brazed except those at the pump. Here the tube was brazed to a 1" nipple so that a union could be used to facilitate pump removal. A baffle must be installed in the sump to prohibit chips entering the pump.

Suitable cutting oils may be secured from any of the major oil companies. Some have been developed that are highly transparent. This transparency is indeed a desirable factor in the school shop because it permits visibility to inspect the cutting action of the tool and does not present a messy appearance.

Another phase of school machine-shop practice that needs some attention, before it can be considered comparable to methods used in industry, is grinding. Much of the grinding is done dry, and suitable coolant systems should be provided. The use of a coolant for grinding has about the same effect as a coolant used on a cutting tool. Because of the nature of the material removed, as well as the grain removed from the wheel, it is necessary to have tanks with greater capacity, and a larger baffle area so that the pump will be supplied with clean coolant.

If the grinding machines are used dry, they must be equipped with adequate exhaust systems. Silicosis, a serious lung disorder, is the disease caused by the breathing of air containing heavy concentrations of dust. The dust from grinding operations does not manifest its damaging effects on the respiratory system until quite some time after exposure—years later, perhaps. Grinding dust, not properly removed, also does serious damage to the grinding machine as well as to other machines in the immediate area. Most machines made for grinding are supplied with hoods, designed not only to protect the operator against wheel breakage, but for exhausting the dust as well. Many school shops should take inventory of their grinding equipment and determine if the dust problem is being properly cared for by either wet grinding or adequate exhaust systems. Many dust collectors are now on the market which will furnish the needed protection to a machine and its operator. Some are a combination of cyclone and cloth filter, the combination of which will clean the air so that it can be exhausted directly into the room.

A typical dust exhaust system is shown in the illustration. For wheels of 6" in diameter, the minimum diameter of the suction tube is 3". For wheels 7" to 9", the suction tube should be 3½". A minimum of 2200 cubic feet per minute is necessary to remove metal dust, and 1500 feet per minute for lint.

Grinding wheels and buffing wheels should not be exhausted by the same system, because sparks from grinding may ignite the lint from the buffing wheels.

In case the exhaust from the separator is objectionable, a duct may be run outside to conduct the sound out of the room. Gates should be supplied in all branch lines to cut off the machine not in use, and thereby increase the effectiveness of the other branches. The gates and the outside exhaust duct are also illustrated in the photograph.

The following is taken from the Health and Safety Act of the Industrial Commission of Illinois.

"Rule 1: Requirements for installation and operation of exhaust systems:

"Where grinding, polishing, buffing, scratch brushing or abrasive cut-off wheels, grinding and polishing straps or belts are used, there shall be provided in the area where dusts, vapors, gases, or fumes are generated, hoods that are connected to exhaust systems which will remove such dusts, vapors, gases, or fumes, and such exhaust systems shall be operated continuously during any such operations on aforesaid equipment, and such exhaust systems shall be provided with dust arresters, collectors, or precipitators to collect the dust before the air or gases from such exhaust systems are discharged therefrom."

Certainly if the schools are striving to run their shops in a manner comparable to those in industry, they should also consider this vital problem.

Whether machines are exhausted or run wet, the tables should be removed regularly and the ways cleaned, and fresh oil applied. Manufacturers of grinding equipment recommend weekly changes where the machine is run constantly. Once each month would seem a bare minimum for school shops.

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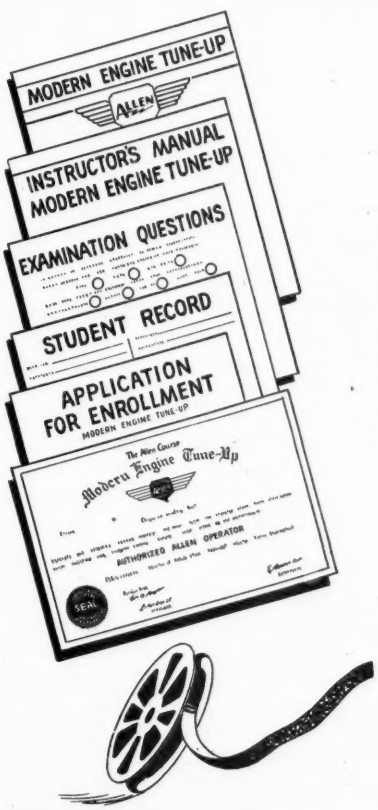

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A Compact Electrical Shop Panel

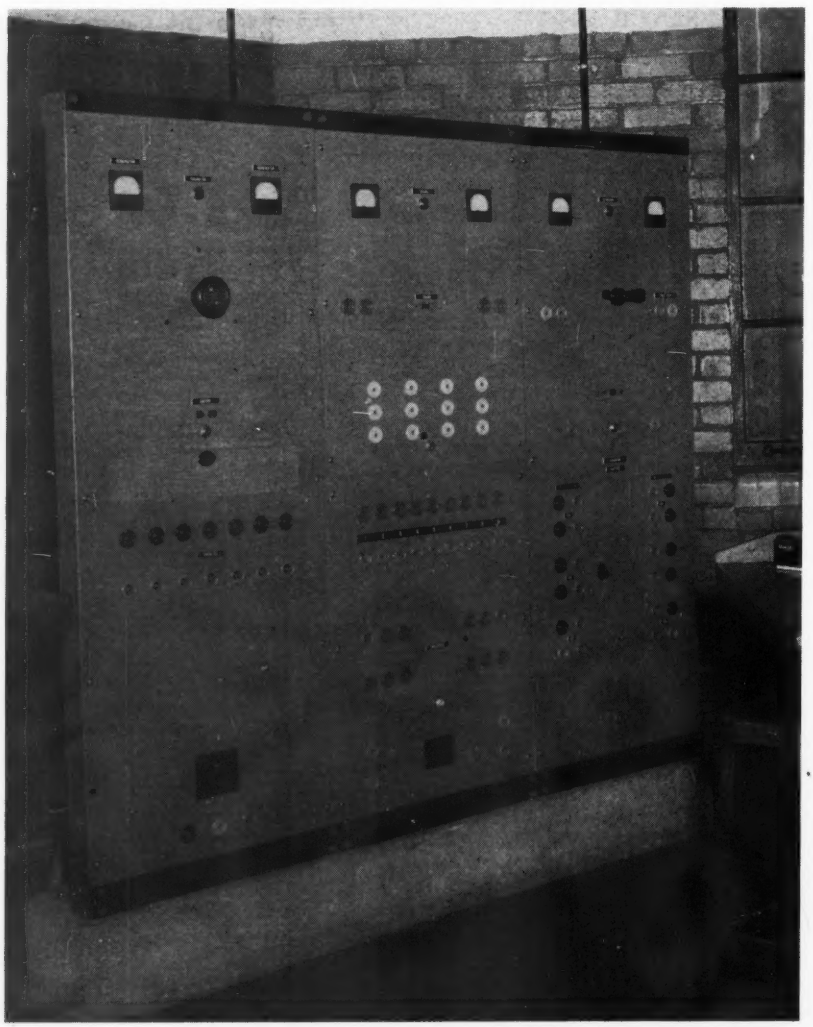
BY *A. A. Vezzani*

This student-made panel has simplified set-ups in the electrical shop and its construction gave students real training in electricity and metal-working. The cost is nominal and the advantages are numerous. A. A. Vezzani formerly taught in the Pontiac, Michigan, High School and is now a member of the staff of the Vocational Education Department, University of Michigan, Ann Arbor.

THE distribution panel described herewith can be used in industrial-arts, vocational, or technical classes. It was constructed by the electrical shop students of the Industrial Education Department of the Pontiac, Michigan, Senior High School. It was designed to provide various ranges of voltages, both alternating and direct simultaneously, to work stations without the necessity of having wires strewn about the shop. The following description offers ideas and suggestions to teachers of electricity who may be interested in the construction of such a distribution panel. The construction of the panel not only created an added interest in the shop, but each student took a personal pride in the fact that he was building something that would be used by the students who were to follow. In use, the panel has proved to be of such assisistance both as a teaching aid and as a means of eliminating details that it has more than offset the trouble and worries that are usually encountered with such a project.

The panel shown here supplies 125 volts a-c at 30 amperes; 110 volts a-c at 30 amperes; 220 volts 3-phase; 4, 8, 12, 16, 20, and 24 volts a-c at 5 amperes; and 2, 4, 6, 8, 10 and 12 volts d-c at 30 amperes.

Figure 1.—Full view of panel showing meters, switches, outlets, locks, and doors to fuse boxes.



The panel consists of four sections mounted in three separate units. Each unit is made up of a rack constructed of two pieces of 3″ channel iron 5′ in length, fastened at the bottom to a piece of ½ x 10 x 24 angle iron which forms the base. The channels are held at the top by means of a piece of ¼ x 2 x 24 cold rolled steel. One channel iron and the base can be seen in the photo. The sections are fastened to these racks by means of 10-32 rack screws. The three racks are held together by strips of cold rolled steel fastened at the bottom front and top rear as shown.

The upper portion of the first section at the left contains the control units and outlets for the 125 volt d-c motor generator set which is mounted directly behind the three sections. It consists of a voltmeter, ammeter, pilot light, field rheostat, start-and-stop buttons, and the switch lock. Below the switch lock is the door to the fuse compartment and two rows of outlet plugs. The switch at the bottom of the panel is an automatic overload switch connected to the three outlets which provide 220 volts 3-phase for motor testing and other jobs requiring this voltage.

The top center section provides variable a-c voltages of 4, 8, 12, 16, 20, and 24 volts. The two outlets under the a-c voltmeter and ammeter are connected directly to these meters and provide a means of measuring the current or voltage in one or more circuits as they are being used. The a-c voltages are supplied by a transformer fastened to the back of the panel and connected to the 12 outlets. A fuse compartment covered by the door shown, a switch, and a switch lock complete the remaining units on this panel.

The lower section in the center of the panel mounts the 18 bench outlets for the nine work stations. Wires from the back of these outlets run directly to the benches through the conduits shown at the top and left of the panel. Two groups of multiple connectors, that is, three outlets in parallel, are mounted below the work-station outlets. Below these is the automatic cut-off master switch which controls all of the 110 volt a-c outlets at the work stations. On both sides of this switch are outlets which provide 110 volts a-c for use near the panel.

In the right section is mounted the d-c voltmeter and ammeter, pilot light, out-

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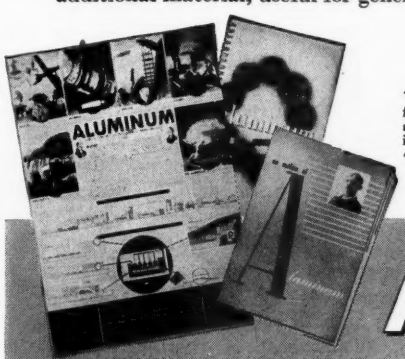

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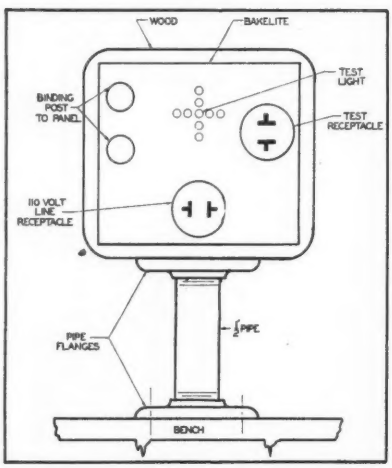
lets for the ammeter and voltmeter, a battery charger which is mounted directly behind the rheostat whose knob is shown between the meter outlets, a toggle switch, and a switch lock. Below this equipment and mounted in a vertical arrangement are the outlet plugs for the direct current voltage of 2, 4, 6, 8, 10 and 12 volts d-c provided by two batteries mounted on a rack behind these outlets. Between the outlets is the fuse compartment, access to which is obtained by the door shown.

As indicated above, the panel feeds into work stations. Each work station is equipped with a single or double faced bench unit as shown in Figure 2. This unit is made up of two large binding posts, a bakelite panel, a 110-volt 10-watt bulb, 110-volt light socket and two receptacles. Where the units are double, this equipment is duplicated for the opposite side. The two binding posts (black and red) are connected directly to the bench outlets described above and shown at the top of the lower center section. This line is such that it will withstand the voltages and currents which are required at the work stations. The receptacle at the right is connected in series with the 10-watt lamp and the 110 volt a-c line for circuit testing. The light from this unit can be seen through the holes in the panel. The lower receptacle provides a 110-volt a-c outlet. This is controlled by the master switch at the bottom of the center section as described above.

Each section may be locked by means of the S.P.S.T. switch lock which permits the key to be withdrawn only when in the locked position in which case the circuit is broken. Thus, when all of the keys have been removed, the entire panel is locked. This is a safety precaution which is well worth the investment in time and money. Pilot lights indicate when a circuit is unlocked.

Figure 2.—Drawing of bench unit.



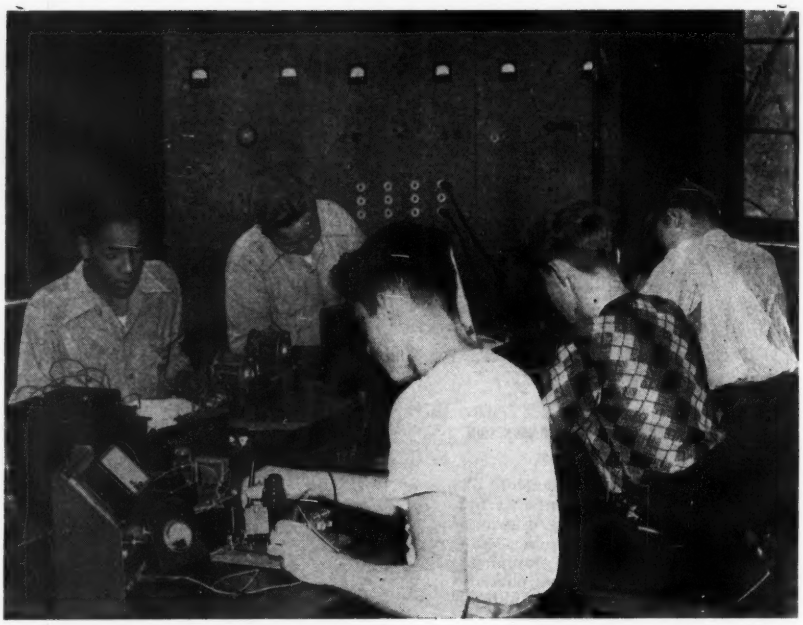


Figure 3.—Students using panel and bench outlets. The outlet at the left in the picture is double-faced, allowing students on each side of the bench to have easy access to it.

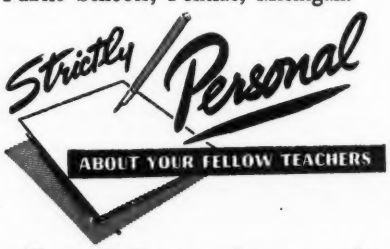
The 18 outlets at the top of the lower center section are connected directly to nine work stations, to the instructor's demonstration table, and to the applied physics laboratory which is next to the electrical shop. Cords with proper fittings at both ends are used to connect the source outlets to the bench outlets.

The plans for constructing the panel were drawn and dimensioned in the related drafting class. After the drawing had been checked, blueprints were made and the work carried on in the shop following the specifications given on the prints. The sections were constructed of 1/8" sheet steel plate obtained from a local distributor. They were cut to size by the distributor and the rough edges filed smooth. However, there is no reason why the sections cannot be made of aluminum, which is now readily available as "surplus stock" at very reasonable prices. This not only would make them lighter but much more easily drilled and worked.

After the machine work was completed on the sections, they were cleaned and painted with a gray, wrinkle-finish varnish which gave them a commercial appearance. This varnish can be obtained from Allied Radio Corporation, Chicago. Many of the accessories can also be obtained from this concern.

The vari-colored outlets and the plugs, cords, name plates, charger, rheostats, etc., shown on the panel, as well as ideas for the construction of similar panels, were obtained from The Standard Electric Time Company, Springfield, Mass.

Blueprints of the panel may be secured at a small charge from E. C. Russell, Director of Vocational Education, Public Schools, Pontiac, Michigan.



HARRY S. BELMAN, former member of the staff of the Wisconsin State Department of Vocational Education and more recently with the Veterans Administration in Milwaukee, has been named associate professor of trade and industrial education at Purdue University, West Lafayette, Ind. . . . ALAN R. PAWALEK has been appointed assistant professor of industrial arts at Ball State Teachers College, Muncie, Ind. . . . WILLARD M. BATESON has been appointed lecturer in vocational education at the University of Michigan, Ann Arbor. . . . DOYLE KEMPER, state supervisor of industrial arts for Missouri, has been named chairman of the department of industrial arts, Southwest Missouri State College, Springfield. . . . JOHN W. CURD of the Breckenridge, Texas, schools has been appointed specialist in trade and industrial education, University of Texas. . . . ROLAND M. TORGERSON has been named head of the industrial-arts department at Bowling Green, Ohio, State University.

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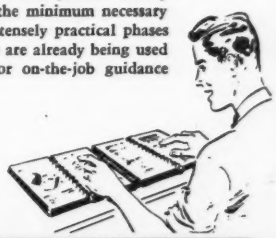

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The Drinking Problem

Numerous requests by pupils to leave the room for a drink of water are disruptive of classwork, and time consuming. Not having a bubbler fountain in the shop, I devised a method of providing water in the shop which eliminates what had been an annoyance, particularly in warm weather.

My room is equipped with a wash basin with hot and cold water faucets. I drilled a 3/8" hole on the top of the cold-water faucet at the middle of the bend downward. All a pupil now needs to do to satisfy his thirst is to close the regular outlet for water with his finger, thus forcing the stream to go upward through the hole in the same manner as a bubbler fountain. The procedure is sanitary, for the faucet does not need to be touched by the lips of the drinker.

To prevent the water from cascading over the basin onto the floor, I adjusted the control valve on the cold-water pipe until the flow was adequate with the faucet wide open.—*H. J. Miller, Gillespie Junior High School, Philadelphia, Pa.*

SHELDON

TRBU-S56
Precision lathes

Accuracy, Capacity and Safety

Because this is an age of precision machining of ever closer tolerances, any practical course in machine shop should stress and demonstrate accuracy. Among lathes that can come within the average school budget, the Sheldon TRBU-S56 is outstanding. Here is a moderate priced lathe with accuracy features of the largest and most costly lathes. "Zero Precision" Taper Roller Bearings, one of the finest bearings obtainable, permits this lathe to work to the very closest tolerances over a full range of speeds. A true industrial tool room lathe, TRBU-S56 has industrial capacity—11¼" swing, 1" collet capacity and standard industrial features and controls.

But of greatest importance to any school is its *Safety.* To assure utmost safety the headstock and drive are entirely enclosed and speed changes are controlled with external levers. It also comes on modern steel bench with 5 individually locking drawers for tools, aprons, drawings and work.

SHELDON MACHINE CO. Inc.
Manufacturers of Sheldon Precision Lathes • Milling Machines • Shapers
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Solving a Sticky Problem

Glue jars filled with an assortment of pieces of wood ranging from a sliver to a fair-sized piece of timber are an abomination in the school shop. Compounding this crime is to have other pieces of wood left on the glue bench after they have been used as spreaders.

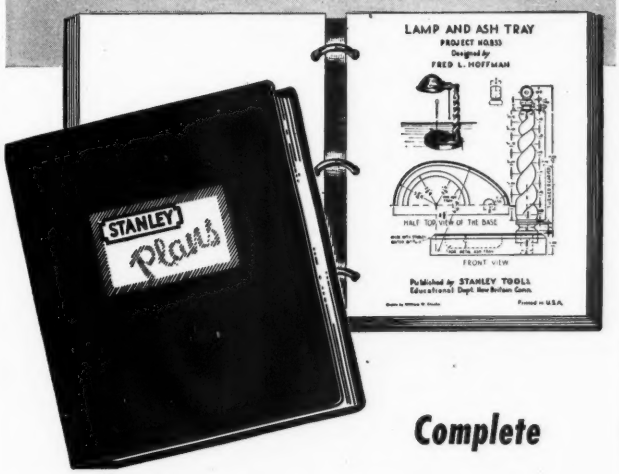
I have found a method of preventing these occurrences which is easy to administer and teaches pupils good habits of neatness and orderliness. I have the students use scrap stock to make glue sticks 6" to 8" long, 1/16" to 1/8" thick, and 1/4" to 3/8" wide. This job can be used to fill idle moments and gives good practice in using the band and circular saws. The sticks are placed in a can which is on the glue bench next to the glue jar. Beside the bench is a sign stating, "Keep glue covered. Throw away stick after use."

Problems of keeping the glue under control have now melted away with this simple procedure. Incidentally, teachers in the lower grades frequently call on us for these sticks to use for paste work.—*Wallace K. Hart, Rangeley, Maine, High School.*

Welding Rails

When a cement floor is to be laid in that new welding or metal shop; lay I-beams or railroad rails 6′ or 8′ apart across the floor and finish the floor flush with the top of the beams or rails. In fact, they can be used to guide the straight-edge when finishing. These metal surfaces on the floor of the shop are excellent for tack-welding any metal form or frame under construction as a means of holding it in place. A blow with a sledge will break the weld when it is desired to move the completed job. This idea is frequently used in industry and is useful in certain types of school shops. — *James Studebaker, Topeka, Kansas, Trade School.*

STANLEY PLANS



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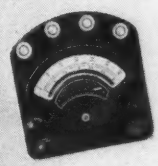

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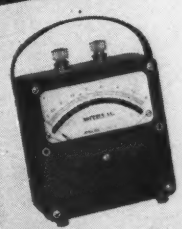

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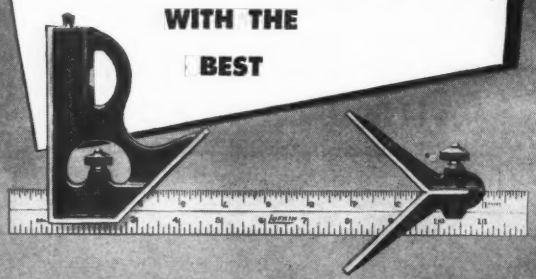

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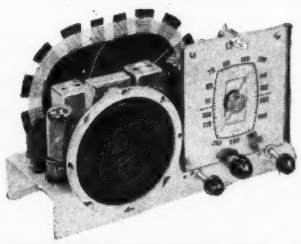

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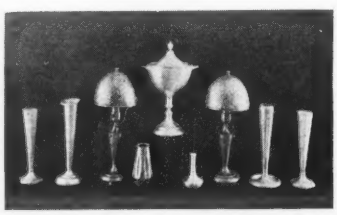
A few examples of metal spinning made in the shop of a Michigan high school



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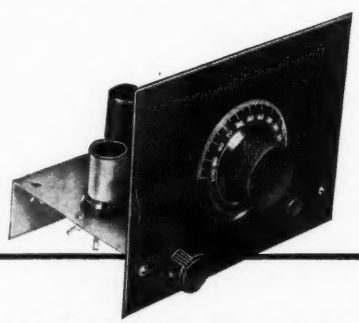

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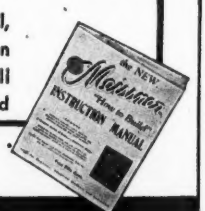

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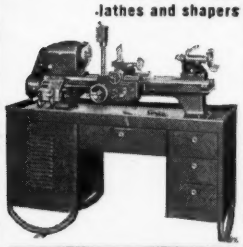

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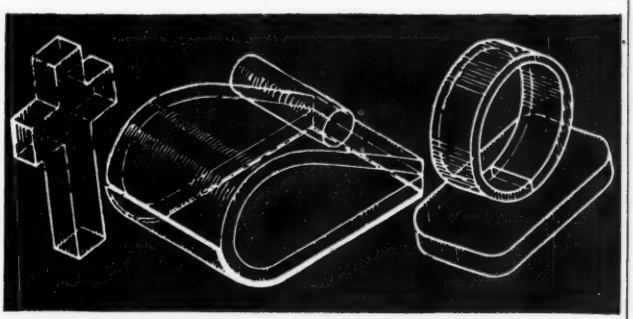

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NEWS

What's Doing in the Field of INDUSTRIAL EDUCATION

Teachers Learn from Industry

ILLINOIS' newest wrinkle is to draw men from industry to teach vocational teachers the vital new industrial developments which affect training they must "hand on." Local school boards, with the aid of the Illinois State Board for Vocational Education, paid the salary and traveling expenses of their vocational machine-shop instructors during a workshop conference which was staged by the Trade and Industrial Education Service at the Peoria Vocational School recently. Instructors to "teach the teachers" were supplied by the Industrial Training Division of Carboloy Co., Inc., the Bardons and Oliver Turret Lathe Co., Caterpillar Tractor Co., Carborundum Co., and the Do-All Co. The workshop lasted two weeks in August and 24 teachers attended.

RPI Offers Vocational Courses

RENSSELAER Polytechnic Institute, Troy, N. Y., is now offering courses leading to the degrees of bachelor of science in vocational education and master of science in education. Cooperating in the program are the New York State Department of Education and the State College for Teachers at Albany. Under the plan, students attending the State College for Teachers at Albany will take courses in technical fields at RPI. These courses will be offered evenings, Saturdays, and in the summer sessions. The program is under the direction of Professor Stanley B. Wiltse.

Safety Forms Available

A STUDENT accident report form has been prepared by the National Safety Council for the use of schools, which gives the answers to such questions as: What was the student doing at the time of the accident? Was he using any apparatus, machine, vehicle, tool, or equipment? How was he using it? The council recommends the collection, analysis, and use of data on accidents to students as the essential step in the development and evaluation of a safety education program. These data are also valuable in protecting the schools from liability suits and unfavorable publicity. In addition, a booklet on *Accident Records and Analysis* and another on *Keeping Accident Records* are available from the Council, 20 North Wacker Drive, Chicago 6, Illinois.

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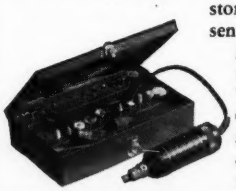

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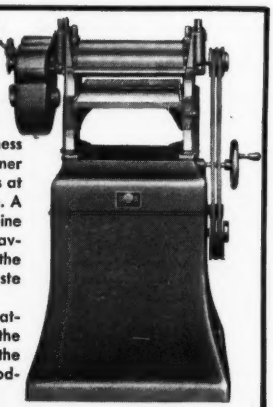

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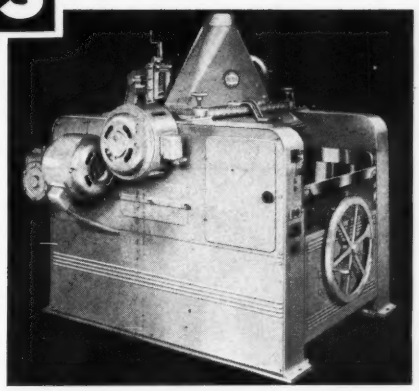

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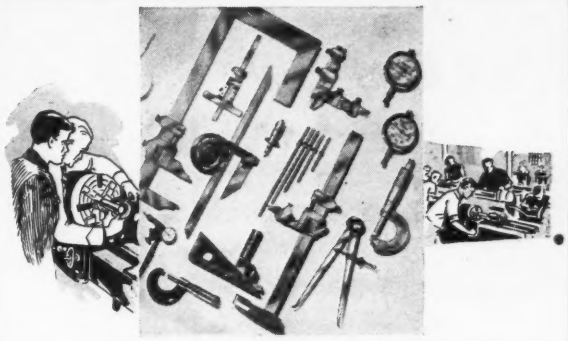

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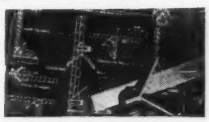

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Quote

A Negro boy, going through a cemetery, read this inscription on a tombstone: "Not dead but sleeping." The lad scratched his head a while and remarked to himself: "He sho' ain't foolin' nobody but hisself."—Cactus News, hm, Southwest Petroleum Co. Inc.

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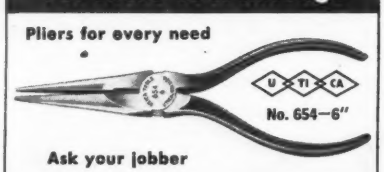

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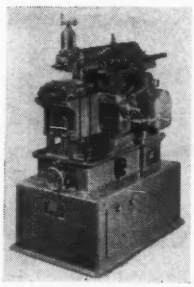
News from INDUSTRY

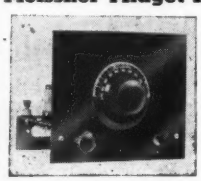
Sheldon Adds a Shaper



Sheldon Machine Co., Inc., Chicago, builders of Sheldon lathes and Sheldon-Vernon milling machines, announces a new 12" precision shaper.

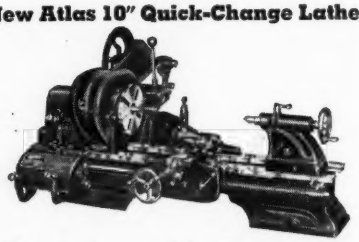
While listed as a "moderate-priced" machine tool, the new shaper is designed to do all shaper work within its capacity—filling the gap between the large, heavy industrial shapers and the small bench machine, and following in basic design, precision features, and control conveniences the newer toolroom shapers. Its streamlined pedestal fully encloses a variable-speed motor drive which provides all speeds from 12 to 180 strokes per minute at the turn of a hand wheel. It has automatic cross feeds in both directions of from .0025" to .0175". Its swivel table and swivel vise come as standard equipment. For full details, write Sheldon Machine Co., Inc., 4258 N. Knox Ave., Chicago 41, Ill.; *or check no. 6 on the coupon.*

Meissner Midget Receiver



The Meissner 3-tube, AC-DC midget receiver kit is the answer to the radio beginner's craving for knowledge. Operating on the regenerative principle it is capable of receiving local and long-distance broadcast stations and world-wide short-wave stations. By the use of plug-in coils many different frequency bands can be covered. A coil for the broadcast band is furnished with the kit. The kit is supplied with instructions, less tubes and headphones. For complete information, write Meissner Mfg. Div., Maguire Industries Inc., 500 W. Huron St., Chicago 10, Ill.; *or check no. 7 on the coupon.*

New Atlas 10" Quick-Change Lathes



The new, low-cost Atlas 10" quick-change lathes save set-up and operating time on every turning operation. The quick-change mechanism provides instant fingertip selection of 54 threads and feeds—45 are obtained by merely shifting two levers on the gear box, and an additional 9 by changing the position of a sliding gear. The mechanism does not in any way limit the odd thread and feed range capacity of the Atlas lathe. Change gears are available for hundreds of additional threads and feeds, for jobs such as metric threading, coil and wire winding, and special tooling.

Other features of their compact design include Timken tapered roller bearings, precision ground bed, 16 spindle speeds, back gears for extra power, etc. For complete specifications, write for an illustrated catalog to Atlas Press Company, 2336 N. Pitcher St., Kalamazoo 13D, Mich.; *or check no. 8 on the coupon.*

Five Ellipses

A set of five ellipses that covers almost every drafting and engineering need is now being marketed by the C-Thru Ruler Co., Hartford, Conn. It consists of 15, 30, 35, 45, and 60-degree ellipses, and each template permits the drawing of any ellipse from ¼" to 12" in diameter.

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For complete information, write to the C-Thru Ruler Co., 827 Windsor St., Hartford, Connecticut; *or check no. 9 on the coupon.*

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Blackhawk Wrench Catalog No. 247—lists socket, box-type, and open-end wrenches and sets, including new "Nugget" double-duty-drive socket wrenches. For free copy, write Blackhawk Mfg. Co., Milwaukee 1, Wis.; *or check no. 11 on the coupon.*

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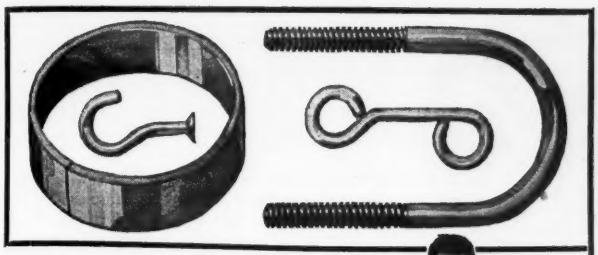

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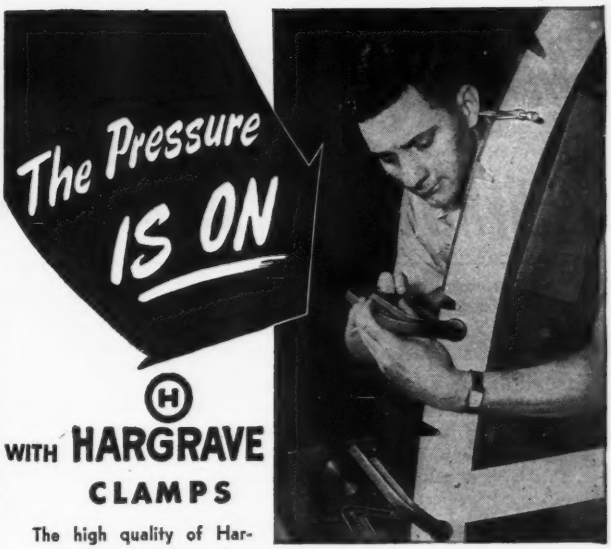

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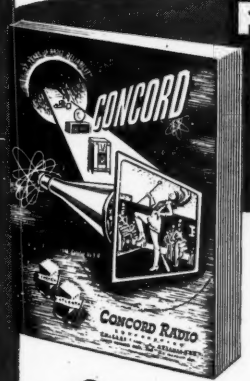

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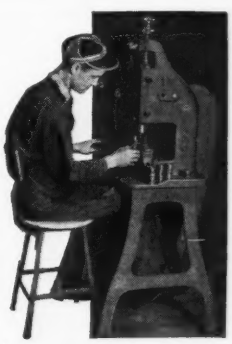

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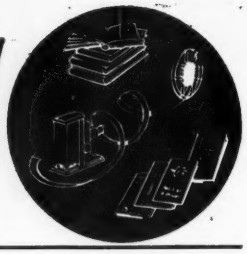

Essentials of Strength of Materials. Pisani. New York: D. Van Nostrand Co., Inc., 1947. Pp. vii+229. $2.80.

This book is unique in that it is the only book on the subject that has been issued to date expressly for high-school students, according to the publishers. There are many good college texts in the field, of course, but the author has adapted the subject matter for presentation to high-school and technical-institute students by the elimination of the use of calculus and no mathematics background beyond algebra is assumed. The presentation is simpler than in the college texts and covers the fundamental principles of strength of materials with a careful choice of illustrative material suitable for secondary-school students. The publishers state that a mathematics or science teachers can give the course, even though they have not had engineering training, with this text.

Torquato J. Pisani is a teacher of applied mechanics, Brooklyn, N. Y., Technical High School.

An Introduction to Drafting. Pawelek. Boston: D. C. Heath and Co., 1947. Pp. xi+125. $1.48.

An unusual approach is used by the author of this book for beginners. The entire emphasis is on understanding the basic knowledges of drafting such as types of representation, principles of orthographic projection, rules of dimensioning, symbols, and others. To this end, all of the presentation is in the form of freehand sketching with no use of drafting instruments called for. The author's contention is that understanding should come first and that the motor skills should be taught after the student has a real understanding of the theory underlying drafting technics. The language is as simple as possible so that the beginner will not be overwhelmed by the new vocabulary of drafting. The author covers picture drawing as an area familiar to students and then goes into two-view and three-view drawings, lettering, and dimensioning. Teachers of drafting will find this an interesting and unique approach to their subject.

Stanley J. Pawelek is Supervisor of Industrial Education, Baltimore, Md., Public Schools.

Carpentry for the Building Trades. Lair. New York: McGraw-Hill Book Co., Inc., 1947. Pp. vii+188. $1.80.

The author states that the aim of this book is "to provide in text form the essentials of practical carpentry for the building trades; to bring into organized form the fundamental objectives of the construction of the small and medium-sized frame house; and to provide a definite course for high-school, technical-school, vocational-school, apprenticeship and veterans' apprenticeship classes in carpentry." He has succeeded admirably in accomplishing his objective. All branches of house building construction are dealt with from framing to blueprint reading and safety measures. A section is devoted to projects, questions, and problems. A helpful feature is a list of visual aids with their sources.

Elbert A. Lair is instructor in building trades, Jacksonville, Illinois, High School.

Job Sheets for Sheetmetal Die Design is a 76-page manual developed to teach the principles of operation, construction, and design of sheetmetal dies. The problems presented are a cross section of the sheetmetal die trade. The major units covered are blanking dies, compound dies, forming dies, progressive dies, draw dies, trim dies, cam dies, and assembling dies. The time required to complete the problems is approximately 840 hours. The mimeographed manual is written by A. A. Vezzani, Lecturer in Industrial Education, University of Michigan, and J. L. Atwell, Instructor in Tool and Die Design, Pontiac, Mich., High School. Copies may be secured from the latter for $1.75 with a quantity discount.

Industrial Arts Education for Junior and Senior High Schools is a 26-page pamphlet which has been prepared by P. S. Waldeck, State Supervisor of Industrial Arts for Ohio, and issued by the Ohio State Department of Public Instruction, Columbus, to serve as a guide in the planning and administration of a program of industrial-arts education in the state. Topics considered range from objectives and guiding principles to shop planning and equipment selection.

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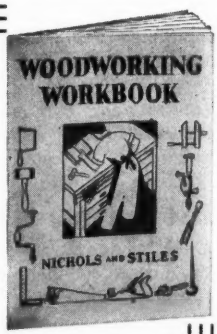

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From Washington *from page 28*

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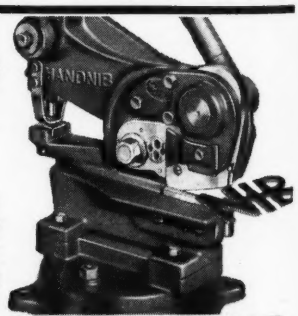

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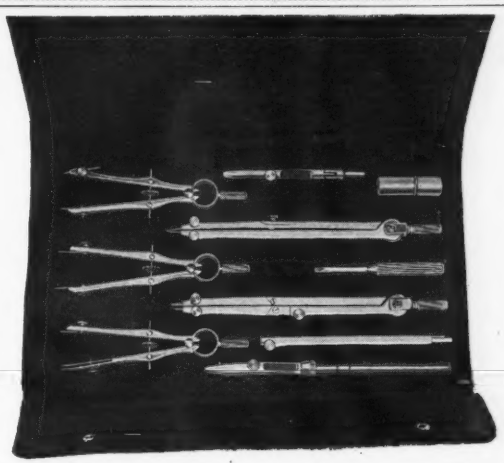

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FROM WASHINGTON

BY MICHAEL PACA

New Home for Vocational Division

THOSE who have occasion to visit Washington on business with the Vocational Education Division should know that the entire federal vocational education family is now under one roof. New home of the division is the Social Security Building, within view of the Capitol and only a few minutes' ride from Union Station. (Previously, part of the division was housed in temporary barracks near a brewery.)

More important, the federal arm of vocational education (together with the rest of the U. S. Office of Education), also has a new overseer. He is Oscar Ewing, Federal Security Administrator, who last month became responsible for Office of Education activities together with health, social-security, and child-welfare functions of the federal government.

Mr. Ewing is an attorney by training and profession. But he brings to this job the attitude of a judge and arbiter, rather than of an advocate. Right now he is doing a lot of listening.

As official after official comes before him to plead special causes and interests, Mr. Ewing listens calmly and sometimes makes a few notes. Recently he received a delegation from the American Vocational Association. The visitors ostensibly came to pay their respects to the new Administrator and to suggest to him how the Office of Education and AVA may work together more closely. It was a closed meeting with no observers present. But it is safe to say that the Administrator listened to the AVA story and filed its facts for future reference when he becomes more thoroughly acquainted with all phases of the case.

"I am now boning up on a lot of cases," he said, using language he acquired during his many years in courts.

"My job will be to help the specialists to bring their cases to the President, when necessary; to plead their cause to the Congress; and to interpret their needs to the people. I also think I'll spend a little time trying to make peace among various experts and specialists themselves," he said with a smile.

Final Report on Surplus Property

This will probably be SCHOOL SHOP's last report on surplus property. Within a few months only heaps of junk and white elephants will be left. The War Assets Administration wants to get out of business as quickly as possible. It (and its predecessors) have sold two-thirds of the 20 billions worth of material; the remaining one-third is the hard core of the surplus.

Nevertheless, there are still many usable items left in WAA warehouses all over the country. Officials in Washington suggest that school-shop men may strike bonanzas among the following:

1. Surplus textbooks, of which there were about 3,000,000 copies when last inventoried. Officials say that many of the texts would make good reference works for school-shop libraries. Searching through the lists of the texts, as published by the Federal Works Agency, which is in charge of distribution, one may find books on electricity, theoretical mechanics, carpentry, concrete, shop mathematics, arc welding, plane surveying, radio, and drawing. Some are old; some are new. Some titles are plentiful; others are available only in a few copies and may not remain in stock long. But vocational educators who take the trouble to investigate (from their nearest Federal Works Agency field office) what texts are still on hand may find it worth their while.

2. The War Assets Administration is also making a last effort to get off its hands a hundred million dollars worth of electronics equipment. It is pleading with school-shop men to use their ingenuity to put this material to work for training purposes. Much of it consists of highly specialized radar and sonar gear. But a good deal of it can be adapted for school-shop projects. Available are broadcasting and receiving radio sets, condensers, capacitors, antennae, wire, telephone equipment, parts of public-address systems, dynamotors, and tubes of all kinds—ranging in size from an inch or less to several feet.

Says the WAA: "There is less competition today in the surplus market than ever before. This fact improves considerably the position of education. There are many 'bargains' every day in every WAA office for education and they are worth the effort required. But you must put forth real effort and you cannot afford to get discouraged."

Railroads Want Help

The nation's railroads have come to the public vocational schools for help. Responding to this call, vocational schools in all parts of the country will soon offer an increased number of courses which will help put and keep our rolling stock in first-class shape.

Here is the background of this story: the highly skilled journeymen who work in the nation's railroad maintenance shops are getting along in years. Many of these elderly craftsmen are at work only because there are no young replacements. But the need for skilled

(*Continued on page* 26)

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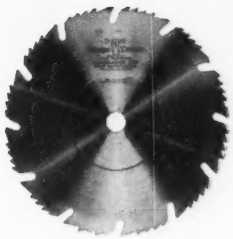
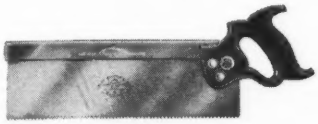


DeLuxe Circular Saws

Band Saws



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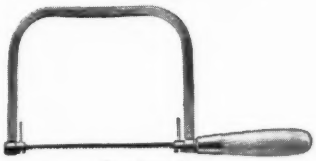

Coping Saws

DISSTON

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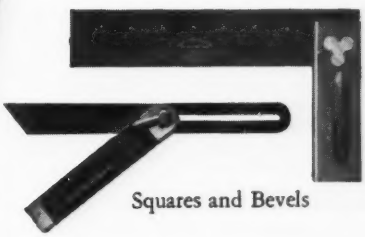

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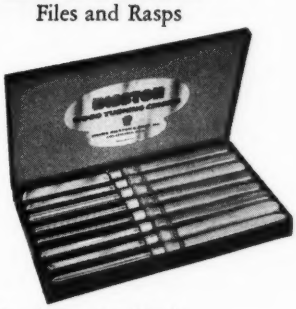
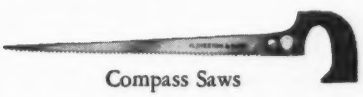
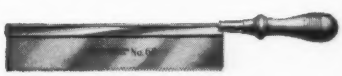


Wood Turning Tools



Compass Saws



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